

ASSESSING FUTURE STABILITY OF US HIGH PLAINS LAND- COVER: INTEGRATION OF PROCESS MODELING WITH LANDSAT, *IN SITU* MODERN AND PALEOCLIMATIC DATA

PI and Co-PIs

Robert S. Webb

Jonathan Overpeck

David S. Schimel

Alexander F.H. Goetz

Gifford Miller

NOAA-CDC/INSTAAR, University of Colorado

ISPE, University of Arizona, Tucson

Max Plank Institute for Biogeochemistry, Jena, Germany

CSES, University of Colorado, Boulder

INSTAAR, University of Colorado, Boulder

Collaborators

Noah Daniels

Jennifer Mangan

Leanne Lestak

Eric Johnson

INSTAAR, University of Colorado, Boulder

CSES, University of Colorado, Boulder

CSES, University of Colorado, Boulder

CSES, University of Colorado, Boulder



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Introduction

- Question: What are the past and potential future thresholds of climate change and variability that result in significant High Plains landcover change
- Goal: To enhance current understanding of the sensitivity of High Plains land-cover to climate and human land-use forcing through an interdisciplinary effort involving remotely-sensed data, paleoclimate analyses, and process modeling.
- Approach: 1) document spatial coherency of aridity across the High Plains and improve temporal control on the latest Holocene dune reactivation, 2) constrain the range of land-cover change under specified climate and to understand past High Plains land-cover change, 3) map land-cover responses to hydroclimatic extremes (wet and dry) using LANDSAT images in order to monitor land-cover change and document responses to different climatic forcing.



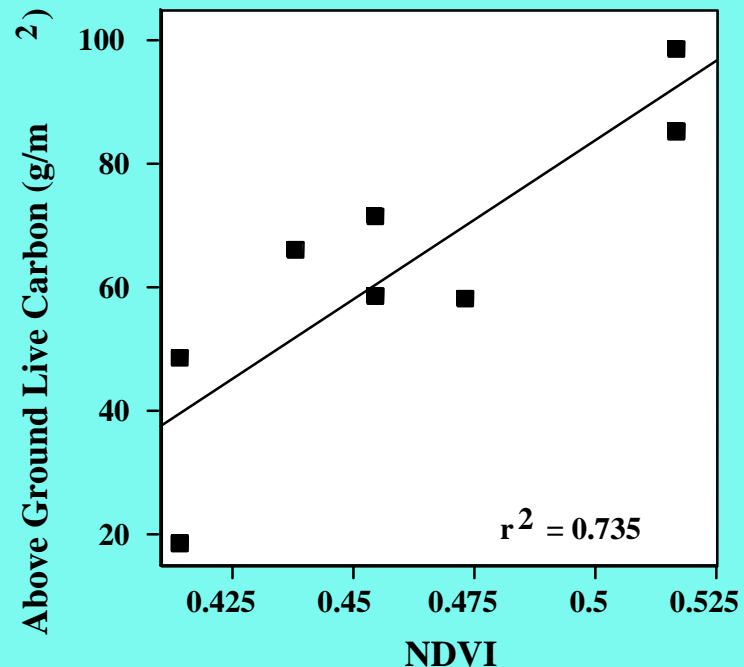
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Results

- ecosystem modeling indicates the persistence of 1930's drought conditions is not sufficient to initiate dune mobilization
- severe, extended drought (>30% reduction in growing season moisture) depletes vegetation sufficiently to initiate mobilization
- the impact of extreme drought is amplified by fire, grazing, or shifts to more homogenous vegetation
- LANDSAT monitored temporal land-cover responses correlate with climate driven ecosystem model simulations of vegetation cover

**CENTURY Model versus LANDSAT
Above Ground Vegetation**

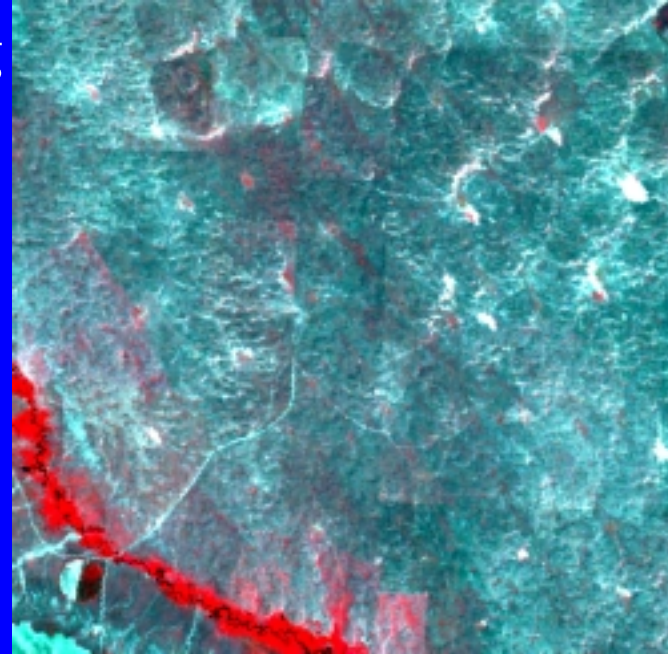


FUTURE WORK

expand current temporal variability with NDVI values from a north-south transect for comparison with CENTURY simulated above ground vegetation and cumulative precipitation anomalies analyses for the Water Year (Oct-Sept)

Conclusions

- Results suggest the possibility of using LANDSAT images combined with process modeling to monitor threshold changes in High Plains landcover and to anticipate dune mobilization responses to hydroclimatic extremes



Publications

- Kerwin, M., Overpeck, J.T. Webb, R.S., DeVernal, A., Rind, D.H., and Healy, R.J., 1999. The role of oceanic forcing in mid-Holocene Northern Hemisphere Climatic Change. *Paleoceanography* 14, 200-210.
- Mangan, J. M., Overpeck, J. T., Webb, R.S., Wessman, C., Goetz, A.F.H. Response of Nebraska Sand Hills Natural Vegetation to Drought, Fire, Grazing, and Plant Functional Type Shifts as Simulated by the Century Model. *in prep.*
- Overpeck, J.T. and Webb, R.S., 2000. Non-glacial Rapid Climate Events: Past and Future. *Proceedings of the National Academy of Sciences U.S.A.* 97: 1335-1338 .
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